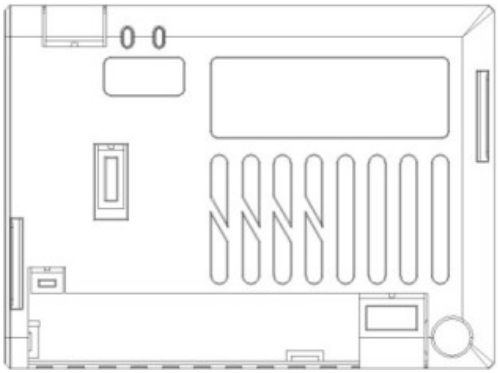
Right choice for ultimate yield

LSIS strives to maximize customers' profit in gratitude of choosing us for your partner.

Synchro Option Module

SV-iS7 Series

User Manual



Safety Instructions

- Use this board after read Safety Instruction of this manual carefully before using and follow the instructions exactly.
- Please hand this user manual to end user and trouble shooting manager
- After read this manual, keep it at handy for future reference.

- 사용 전에 '안전상의 주의사항'을 반드시 읽고 정확하게 사용하여 주십시오.
- 본 설명서는 제품을 사용하는 사람이 항상 볼 수 있는 곳에 잘 보관하십시오.

LS Industrial Systems

Safety Precaution

First thank you for using our iS7 Synchonization Option Board!

Please follow the following safety attentions since they are intended to prevent any possible accident and danger so that you can use this product safely and correctly.

Safety attentions may classify into ‘Warning’ and ‘Caution’ and their meaning is as following:

Symbol	Meaning
WARNING	This symbol indicates the possibility of death or serious injury.
CAUTION	This symbol indicates the possibility of injury or damage to property.

The meaning of each symbol in this manual and on your equipment is as follows.

Symbol	Meaning
	This is the safety alert symbol. Read and follow instructions carefully to avoid dangerous situation.
	This symbol alerts the user to the presence of “dangerous voltage” inside the product that might cause harm or electric shock.

After reading this manual, keep it in the place that the user always can contact. This manual should be given to the person who actually uses the products and is responsible for their maintenance.

WARNING

- **Do not remove the cover while power is applied or the unit is in operation.**
  Otherwise, electric shock could occur.
- **Do not run the inverter with the front cover removed.**

⚠ WARNING

Otherwise, you may get an electric shock due to high voltage terminals or charged capacitor exposure.

- **Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.**
  Otherwise, you may access the charged circuits and get an electric shock.
- **Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power and after checking the DC link voltage is discharged with a meter (below DC 30V).**
  Otherwise, you may get an electric shock.
- **Operate the switches with dry hands.**
  Otherwise, you may get an electric shock.
- **Do not use the cable when its insulating tube is damaged.**
  Otherwise, you may get an electric shock.
- **Do not subject the cables to scratches, excessive stress, heavy loads or pinching.**
  Otherwise, you may get an electric shock.

⚠ CAUTION

- **Be cautious when handling CMOS elements on the option board.**
  It may cause a failure due to static electricity.
- **When changing and connecting communication signal lines, proceed the work while the inverter is turned off.**
  It may cause a communication error or failure.
- **Make sure to connect the inverter body to the option board connector accurately coincided each other.**
  It may cause a communication error or failure.
- **Make sure to check the parameter unit when setting parameters.**
  It may cause a communication error.

Table of Contents

Safety Precaution iii

Table of Contents v

1. Installation Conditions 7

2. Product Standard 8

3. Installation 10

4. Ready for Synchronization Operation 12

5. Position Sync Operating 14

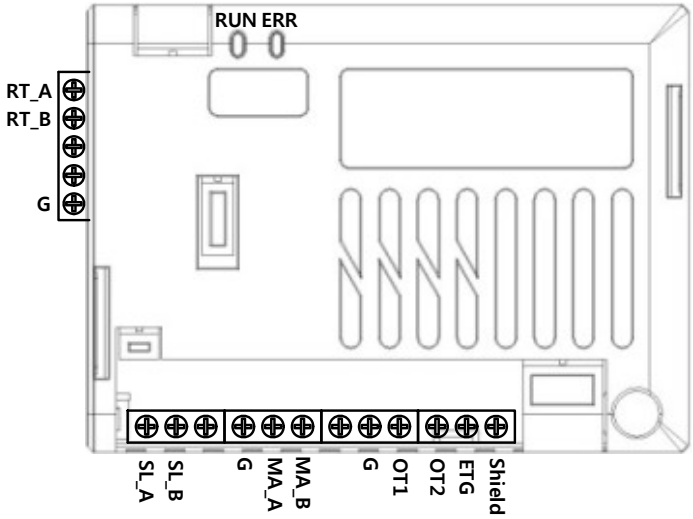
6. Speed Sync Operating 27

1. Installation Conditions

Item	Standard
Service Temperature	-10℃ ~ 50℃
Storage Temperature	-20℃ ~ 65℃
Ambient Humidity	Relative Humidity less than 90% RH (No condensation)
Vibration	Less than 1,000m, Less than 5.9m/sec^2 (0.6G)
Surrounding Environment	No corrosive gas, flammable gas, oil mist, dust shall be inside the room.

Table 1 Installationi Conditions

2. Product Standard



Item	Standard
How to Mount	▪ Mount it to slot 2(bottom slot) of iS7 inverter body.
Master Encoder Input	▪ Maximum 100kHz ▪ The Master Encoder's Return Pulse Output is received as Input.
Slave Encoder Input	▪ Maximum 100kHz ▪ The Slave Encoder's Return Pulse Output is received as Input.
Master Encoder Return Output	▪ Maximum 100kHz ▪ The Master Encoder's Input is outputted as Return Pulse.
Terminal Block Output	▪ Output Score: 2 points ▪ Output Specification: 26V, 100mA
Available slaves to be connected	▪ 15 slaves per mater

Table 2 Hardware Standard

Item	Performance Standard
Position Sync	Within ±5 degree, the deviation in position between the master and the slave during steady-state operating under the rated load.

Item	Performance Standard
Speed Sync	Within a bigger value between ±0.5% and ±5rpm, the deviation in speed between the master's order speed and the slave's current speed during steady-state operating under the rated load. 1)

Table 3 Performance Standard

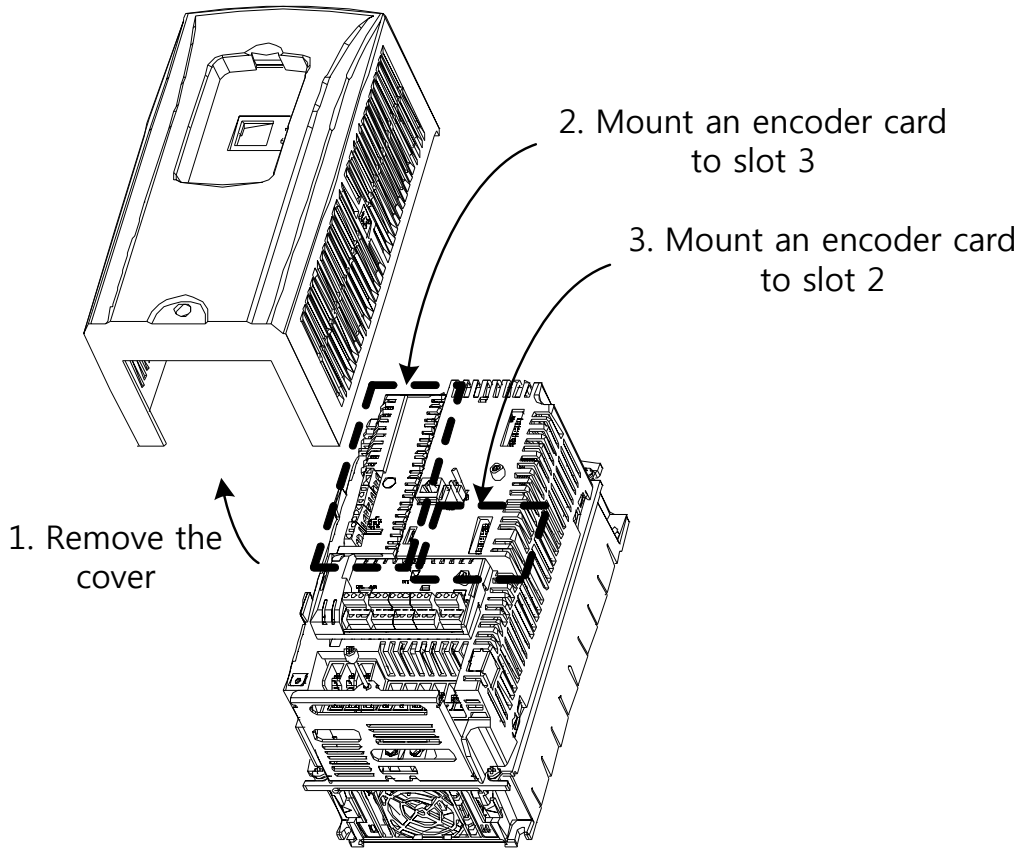
1) For example, if the speed of the master's command is 1800rpm, the maximum deviation between the speed of the master's command and the one of the slave's command shall be within ±9rpm (=±0.5%). In addition, if the master's command speed is 500rpm, the maximum deviation between the speed of the master's command and the one of the slave's command shall be within ±5rpm since ±2.5rpm (=±0.5%) is smaller than ±5rpm.

Item	Name	Description
Master Encoder Input	MA_A	Master encoder phase A input
	MA_B	Master encoder phase B input
	G	GND
Slave Encoder Input	SL_A	Slave encoder phase A input
	SL_B	Slave encoder phase B input
	G	GND
Master Encoder Return Pulse Output	RT_A	Master encoder phase A return pulse output
	RT_B	Master encoder phase B return pulse output
	G	GND
Digital Output Contact	OT1	Open collector digital output contact 1
	OT2	Open collector digital output contact 2
	ETG	Exclusive GND for digital output
Shield	SHIELD	Common shield line

3. Installation

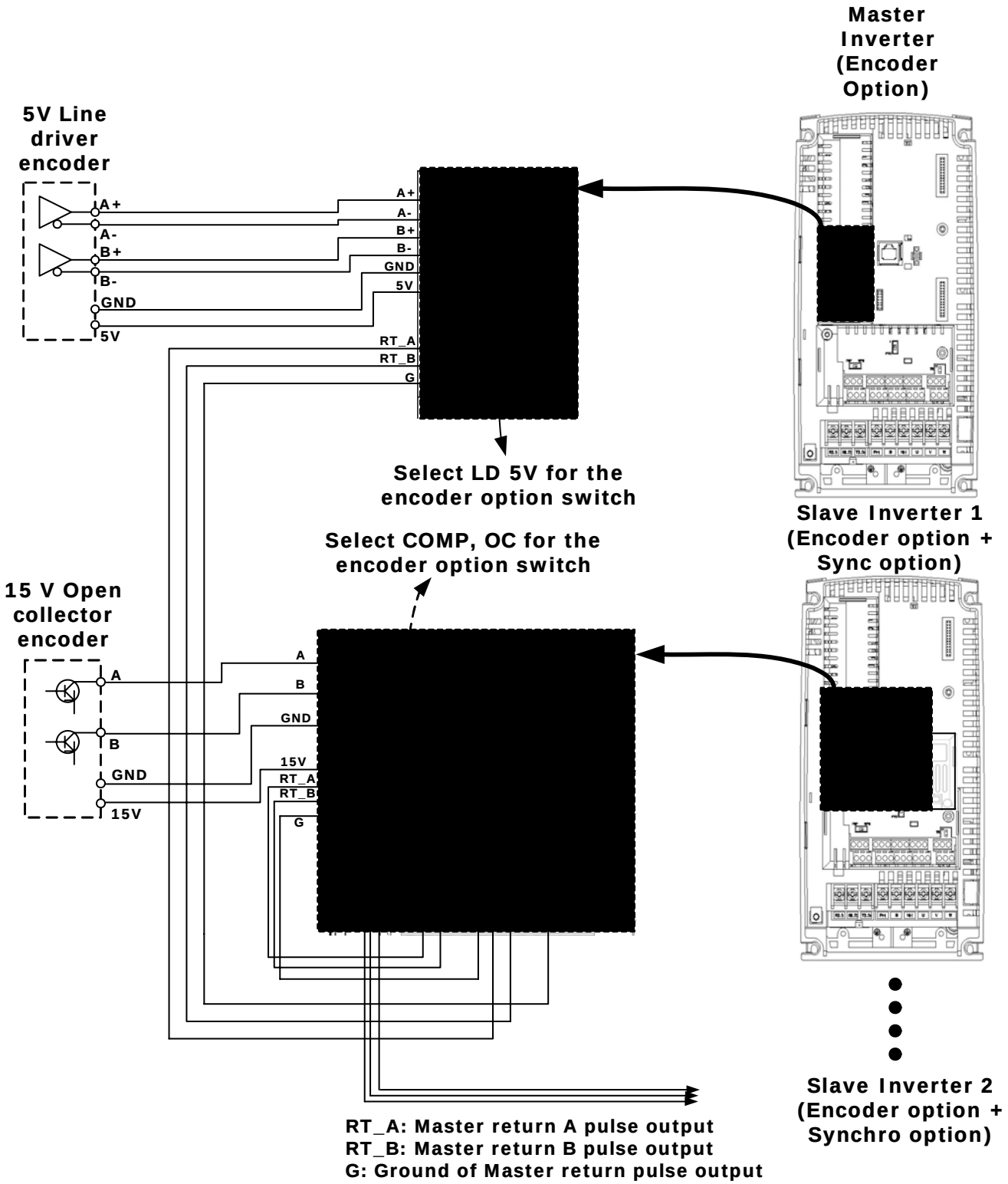
Step 1

Remove the cover and mount an encoder option card (slot 3) and a synchronization option card (slot 2) as seen in the figure below. But, if any inverter is used as the master for the synchronization operation, the master inverter does not need any synchronization option card to be mounted (Refer to Step 2).



Step 2

Wire the encoder option card (slot 3)and the synchronization option card (slot 2) as seen in the figure below. The following figure shows a wiring example of the case where the master motor's encoder is of 5V line driver type and the slave motor's encoder is of 15V open collector type.


Master Inverter (Encoder Option)
5V Line driver encoder
A+
A-
B+
B-
GND
5V
A+
A-
B+
B-
GND
5V
RT_A
RT_B
G
Select LD 5V for the encoder option switch
Slave Inverter 1 (Encoder option + Sync option)
Select COMP, OC for the encoder option switch
15 V Open collector encoder
A
B
GND
15V
A
B
GND
15V
RT_A
RT_B
G
Slave Inverter 2 (Encoder option + Synchro option)
RT_A: Master return A pulse output
RT_B: Master return B pulse output
G: Ground of Master return pulse output

4. Ready for Synchronization Operation

It is the way how to set the master inverter (DRV-09 Control Mode: sensored vector operating mode) and the slave inverter (DRV-09 Control Mode: sensored vector operating mode) and tune the motor before operating the speed (or position) synchronization.

Step 1. Check the motor's rotating direction

a. Set DRV-01 Cmd Frequency to a low speed (10Hz or below) and set DRV-06 Cmd Source to Keypad.

b. Set DRV-09 Control Mode to V/F and make a forward command with keypad and check if plus (+) value is read when monitoring APO-08 Enc Monitor.

c. If it is minus (-) value, change the setting of APO-05 Enc Pulse Sel to –(A + B).

Step 2. Set the encoder option

a. Set APO-01 Enc Opt Mode to Feedback.

b. Input APO-06 Enc Pulse Num into the Encoder pulse Standard (E.g. 1024).

c. Set DRV-09 Control Mode to Vector (sensored vector operating mode).

d. Set DRV-06 Cmd Source (operating command source), DRV-07 Freq Ref Src (Frequency command source), DRV-03 Acc Time (acceleration time) and DRV-04 Dec Time (deceleration time) respectively.

Step 3. Master/Slave Motor tuning

a. Read the Motor's nameplate to input BAS-11 Pole Number (number of motors' pole), BAS-12 Rated Slip (Motor rated slip RPM), BAS-13 Rated Curr (Motor rated current), BAS-15 Rated Volt (Motor rated voltage), BAS-16 Efficiency (Motor efficiency) and BAS-19 AC Input Volt (inverter Input voltage).

b. You may select All (rotating tuning) or All StdStl (static tuning) from BAS-20 Auto Tuning. In case that the motor cannot be rotated during the tuning because of excessive load is placed to the motor, select All StdStl (static tuning). However, rotating tuning shows relatively better performance than static tuning and any value close to actual motor integral shall be calculated.

Step 4. Set the external break control function

If BR Control is set from OUT-31~32(Relay1, 2) and OUT-33(Q1 Define), it is possible to use an applicable contact output as external break control. For external break control function, set the function from ADV-41(BR Rls Curr)~ADV-47(BR Eng Fr).

Step 5. Set the synchronization operating mode (Applicable only to slave inverters)

Set APP-01 App Mode to Synchro. Henceforth, you may select a relevant parameter to synchronization operating from SYN Group.

Step 6. Check the direction of Encoder pulse of the master/slave inverter

Especially, for position sync operating, the direction of the master inverter and that of the slave inverter shall be corresponding. Here, it is assumed that it rotates counterclockwise (CCW) when APO-08 Enc Monitor pulse increases (+) and the motor axis is seen from the front during the forward (FWD) operating.

a. Set SYN-21 Sync Mode to 0: SPD Ctrl for the slave inverter. Forward (FWD) operating command shall be simultaneously made in low speed of approximately 5Hz for the master and slave inverter. When monitoring the pulse of the Slave inverter's APO-08 Enc Monitor, check if the pulse increases. If it decreases, exchange MA_A with MA_B and vice versa in the applicable Slave Synchronization option terminal block wiring.

5. Position Sync Operating

The master's load axis position and many slaves' load axis position are synchronized to operate. The master inverter does not need any synchronization option card while the slave inverter uses synchronization option cards to follow the master inverter position.

Since the slave follows the master's encoder position pulse, the Position Sync operating needs to be much more sophisticate than the Speed Sync operating.

In actual, the slave inverter is controlled when the deviation between the master and the slave position is within about 2 degree (= Pi/90 rad) during 1800rpm steady-state operating.

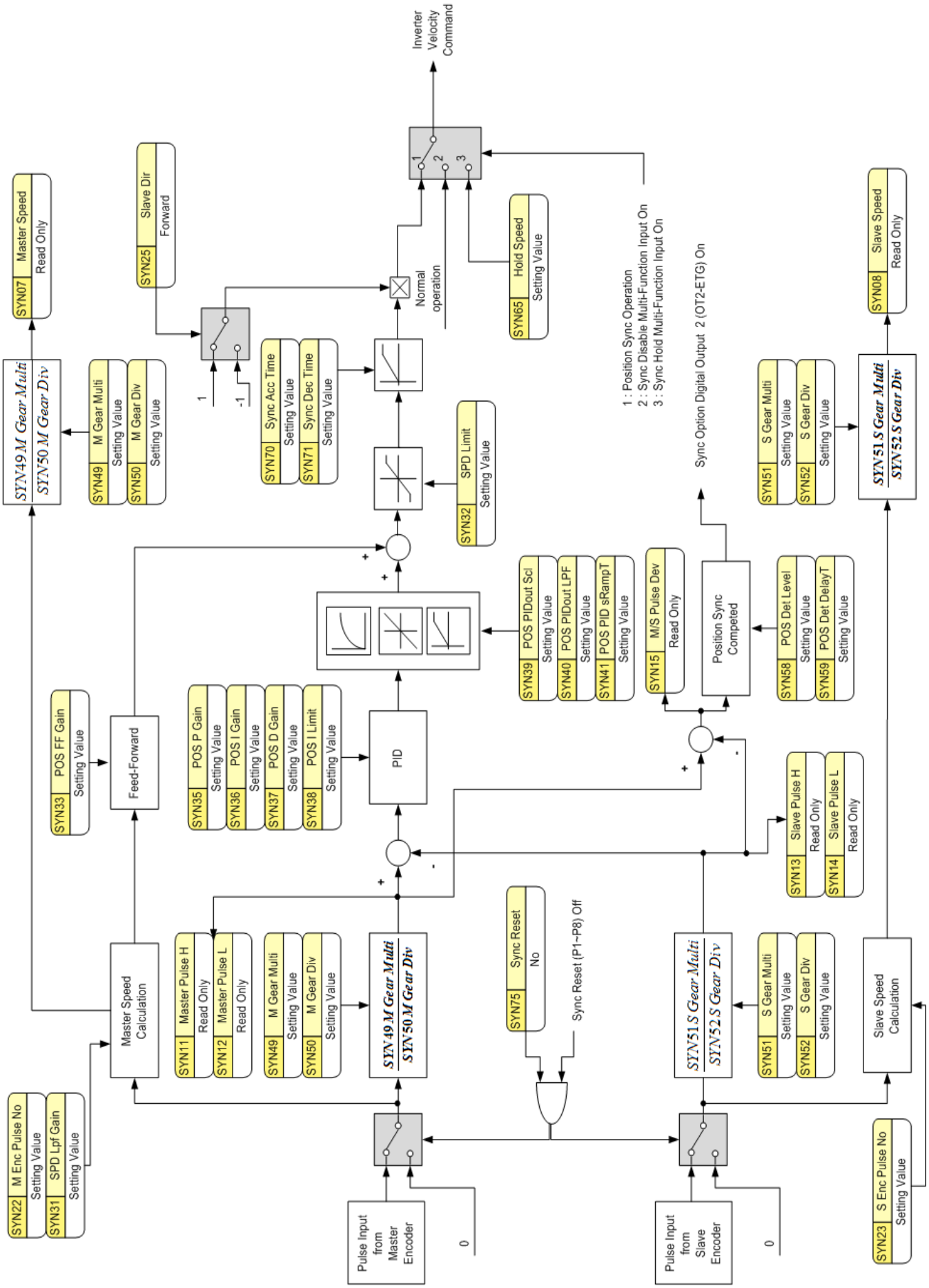
Group	No	Function Display	Setting Value	Setting Range	Unit
SYN	01	Sync S/W Ver	Read only	-	-
SYN	02	Sync LED Stat	Read only	-	-
SYN	03	Sync DO Stat	Read only	-	-
SYN	07	Master Speed	Read only	-	rpm
SYN	08	Slave Speed	Read only	-	rpm
SYN	11	Master Pulse H	Read only	-	Hex
SYN	12	Master Pulse L	Read only	-	Hex
SYN	13	Slave Pulse H	Read only	-	Hex
SYN	14	Slave Pulse L	Read only	-	Hex
SYN	15	M/S Pulse Dev	Read only	-	-
SYN	17	Comm Err Cnt	Read only	-	-
SYN	21	Sync Mode	0 : SPD Ctrl	0 : SPD Ctrl 1 : POS Ctrl	
SYN	22	M Enc Pulse No	1024	360~4096	-
SYN	23	S Enc Pulse No	1024	360~4096	-
SYN	25	Slave Dir	0 : Forward	0 : Forward 1 : Reverse	-

Group	No	Function Display	Setting Value	Setting Range	Unit
SYN	31	SPD Lpf Gain	10	0~30000	ms
SYN	32	SPD Limit	1800	100~3600	rpm
SYN	33	POS FF Gain	100.0	0.0~3000.0	%
SYN	35	POS P Gain	100.0	0.0~3000.0	%
SYN	36	POS I Gain	0.0	0.0~3000.0	sec
SYN	37	POS D Gain	0	0~10000	ms
SYN	38	POS I Limit	2.0	0.0~100.0	%
SYN	39	POS PIDout Scl	100.0	0.0~1000.0	%
SYN	40	POS PIDout LPF	5	0~10000	ms
SYN	41	POS PID sRampT	0.0	0.0~1000.0	sec
SYN	42	PID Limit	20.0	0.0~1000.0	%
SYN	45	POS PI Type	0 : Fixed	0 : Fixed 1 : Proportional	-
SYN	46	POS PropPI Min	10.0	0.0~1000.0	%
SYN	49	M Gear Multi	1	1~30000	-
SYN	50	M Gear Div	1	1~30000	-
SYN	51	S Gear Multi	1	1~30000	-
SYN	52	S Gear Div	1	1~30000	-
SYN	58	POS Det Level	100	0~65535	pulses
SYN	59	POS Det DelayT	1.00	0.00~300.00	sec
SYN	65	Hold Speed	3.00	0.00~maxFreq	Hz
SYN	70	Sync Acc Time	0.1	0.0~100.0	sec
SYN	71	Sync Dec Time	0.1	0.0~100.0	sec
IN	65 ~ 72	Px Define	Sync Disable	-	-
			Sync Hold		

SYN-21 Sync Mode

If 1 POS Ctrl is selected, it is operated in the Position Sync operating. The Position Sync operating is the one in which the slave follows the master's encoder position pulse.

The entire block diagram is as following:


Inverter Velocity Command
SYN07 Master Speed Read Only
SYN25 Slave Dir Forward
SYN65 Hold Speed Setting Value
Normal operation
1 : Position Sync Operation
2 : Sync Disable Multi-Function Input On
3 : Sync Hold Multi-Function Input On
Sync Option Digital Output 2 (OT2-ETG) On
SYN08 Slave Speed Read Only
SYN49 M Gear Multi
SYN50 M Gear Div
SYN49 M Gear Multi / SYN50 M Gear Div
SYN70 Sync Acc Time
SYN71 Sync Dec Time
SYN32 SPD Limit
SYN51 S Gear Multi
SYN52 S Gear Div
SYN51 S Gear Multi / SYN52 S Gear Div
SYN33 POS FF Gain
Feed-Forward
SYN35 POS P Gain
SYN36 POS I Gain
SYN37 POS D Gain
SYN38 POS I Limit
PID
SYN39 POS PIDout Scl
SYN40 POS PIDout LPF
SYN41 POS PID sRampT
SYN15 M/S Pulse Dev Read Only
Position Sync Competed
SYN58 POS Det Level
SYN59 POS Det DelayT
SYN13 Slave Pulse H Read Only
SYN14 Slave Pulse L Read Only
SYN11 Master Pulse H Read Only
SYN12 Master Pulse L Read Only
Master Speed Calculation
SYN75 Sync Reset No
Sync Reset (P1~P8) Off
Slave Speed Calculation
SYN22 M Enc Pulse No
SYN31 SPD Lpf Gain
SYN23 S Enc Pulse No
Pulse Input from Master Encoder
Pulse Input from Slave Encoder
Setting Value
Read Only

SYN-22 M Enc Pulse No

SYN-23 S Enc Pulse No

Input the master and slave encoder's 'Pulses/1 rev' respectively.

SYN-25 Slave Dir

Set the operating direction of the slave motor.

The final operating direction of the Slave Motor depends on

a. The master's operating direction

b. The slave's direction command

c. SYN25 Slave Dir Setting Value

Master operating command	Slave operating command	SYN25 Slave Dir	Slave Motor Final operating direction
Forward	Forward	Forward	Forward
Forward	Forward	Reverse	Reverse
Forward	Reverse	Forward	Reverse
Forward	Reverse	Reverse	Forward
Reverse	Forward	Forward	Reverse
Reverse	Forward	Reverse	Forward
Reverse	Reverse	Forward	Forward
Reverse	Reverse	Reverse	Reverse

SYN-31 SPD Lpf Gain

The Return Pulse Output of the master inverter will be inputted as the master pulse of the slave inverter's synchronization option card. It is possible to set low-pass filter gain for the speed (rpm) decided by its master pulse and make it less sensitive to noise. As a bigger value is given, the effect of removing noise becomes more significant but, the speed response of the save inverter becomes lower.

During the Position Sync operating, the master speed (rpm) that has been low-pass filtered is the input of SYN-33 POS FF Gain, the position controller's feed forward gain.

SYN-32 SPD Limit

It limits to the slave inverter's output speed(rpm).

SYN-33 POS FF Gain

It is the position controller's feed forward gain. By forward compensating the master's current speed, it can increase the response of the Position Sync operating.

SYN-35 POS P Gain

SYN-36 POS I Gain

SYN-37 POS D Gain

It is the PID controller's P/I/D gain for Position Sync.

SYN-38 POS I Limit

It limits the PID controller's Output for Position Sync as the following equation. Therefore, any wind-up due to integral operation can be prevented.

$$\text{Gear ratio of the master's side} = \frac{SYN-49\,M\ Gear\ Multi}{SYN-50\,M\ Gear\ Div} = \frac{38.2}{10.5} \times \frac{19.2}{31.5} = 2.2175 = \frac{22175}{10000}$$

SYN-39 POS PIDout Scl

It adjusts the position PID controller's output scale. If 100% is set, 100% of the position PID controller Output while only 10% of the position PID controller Output will be outputted if 10% is set.

SYN-40 POS PIDout LPF

It is possible to set low pass filter gain to the position PID controller Output. As a bigger set value is given, the position PID controller Output will become more stable but, its response will be lower.

Except special cases, set it to an appropriate value(Less than about 50ms).

SYN-41 POS PID sRampT

It is possible to mitigate a transitional phenomenon in starting by gradually increasing or decreasing the position PID controller' Output during the SYN-41 POS PID sRampT time when starting the slave inverter.

SYN-42 PID Limit

It limits the Position Sync PID controller's Output. It is percentage against the speed[rpm] set from SYN-32 SPD Limit.

SYN-45 POS PI Type

SYN-46 POS Prop PI Min

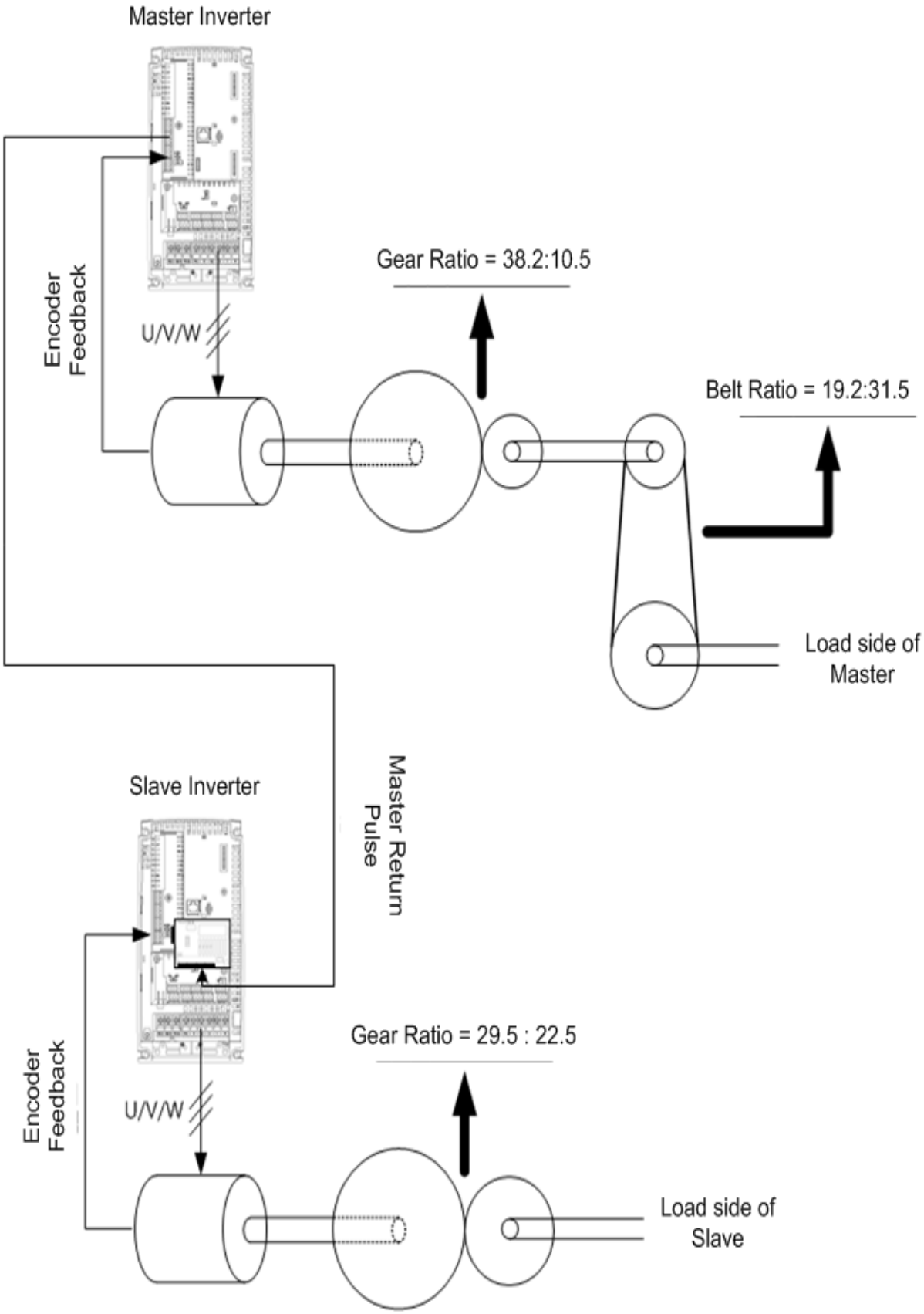
- SYN-45 POS PI Type **"0 Fixed"**: Regardless of the current speed, the PID controller's Output for Position Sync is always fixed constantly .
- SYN-45 POS PI Type **"1 Proportional"**: As speed is lower, the PID controller's Output is reduced proportionally. Since the PID controller's Output becomes excessively lower in low speed, limit to the minimum value of the PID controller to SYN-46 POS Prop PI Min .

SYN-49 M Gear Multi

SYN-50 M Gear Div

SYN-51 S Gear Multi

SYN-52 S Gear Div


Master Inverter
Encoder Feedback
U/V/W
Gear Ratio = 38.2:10.5
Belt Ratio = 19.2:31.5
Load side of Master
Master Return Pulse
Slave Inverter
Encoder Feedback
U/V/W
Gear Ratio = 29.5 : 22.5
Load side of Slave

Input the gear ratio of the master/slave side respectively.

As seen in the figure, the first stage gear ratio of the master side is 38.2: 10.5, and its second stage of belt ratio is 19.2: 31.5. Therefore, the gear ratio of the master side can be calculated as following:

$$\text{Gear ratio of the master's side} = \frac{SYN-49\,M\ Gear\ Multi}{SYN-50\,M\ Gear\ Div} = \frac{38.2}{10.5} \times \frac{19.2}{31.5} = 2.2175 = \frac{22175}{10000}$$

Input 22175 for SYN-49 M Gear Multi and 10000 for SYN-50 M Gear Div.

In the same way, the gear ratio of the slave side is 29.5: 22.5 as seen in the figure. Therefore the gear ratio of the slave side can be calculated as following:

$$\text{Gear ratio of the slave's side} = \frac{SYN-51S\ Gear\ Multi}{SYN-52\,S\ Gear\ Div} = \frac{29.5}{22.5} = \frac{295}{225}$$

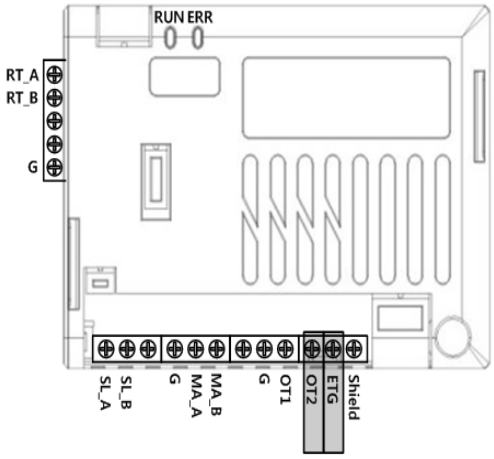
Input 295 for SYN-51 S Gear Multi and 225 for SYN-52 S Gear Div.

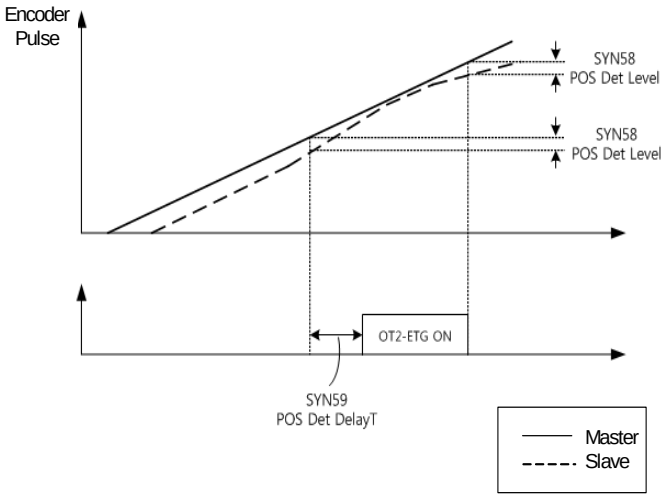
SYN-03 Sync DO Stat

SYN-58 POS Det Level

SYN-59 POS Det DelayT

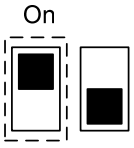
If the deviation between the master motor's load axis and the slave motor's load axis pulse remains within SYN-58 POS Det Level for SYN-59 POS Det DelayT time, Open Collector Digital Output Contact 2(terminal block OT2-ETG in the figure below) will be turned ON.



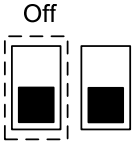


It is possible to monitor the state of Open Collector Digital Output Contact 2 from SYN-03 Sync DO Stat as seen inside of a dotted line of the following figure.

Open Collector Digital Output Contact 2 ON :



Open Collector Digital Output Contact 2 OFF :



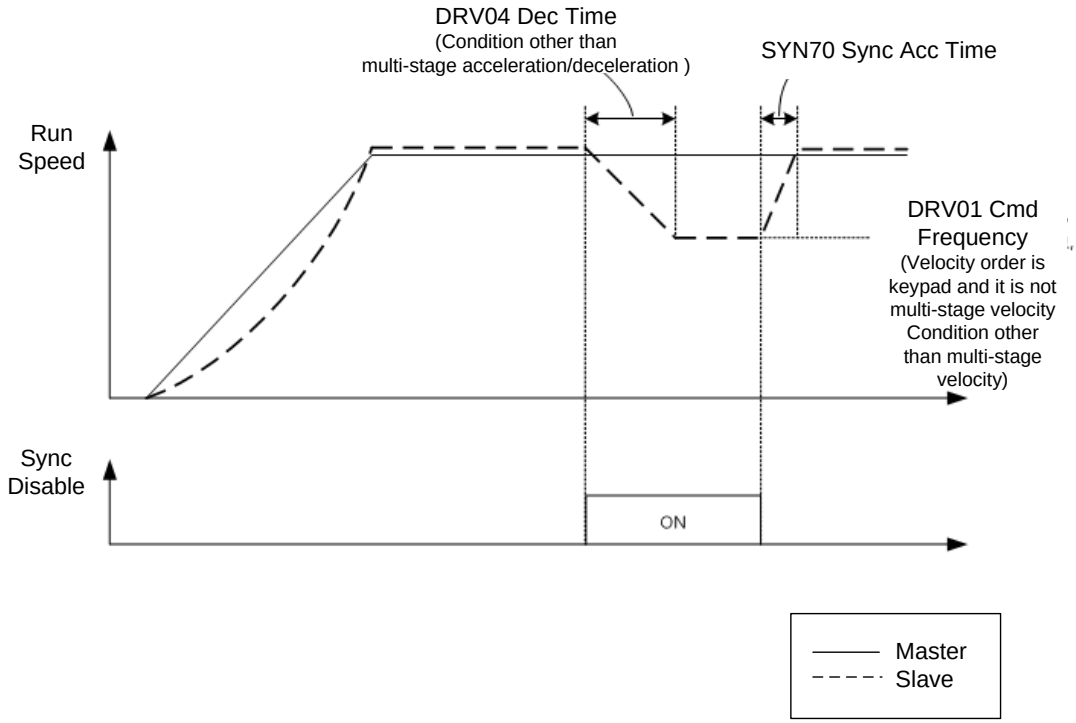
SYN-70 Sync Acc Time

SYN-71 Sync Dec Time

It is a seperate accelerating/decelerating time dedicated to synchronization operating. As a bigger time is given, the response of synchronization operating becomes slower and its performance is deteriorated. Except special cases, it is better to set a short time.

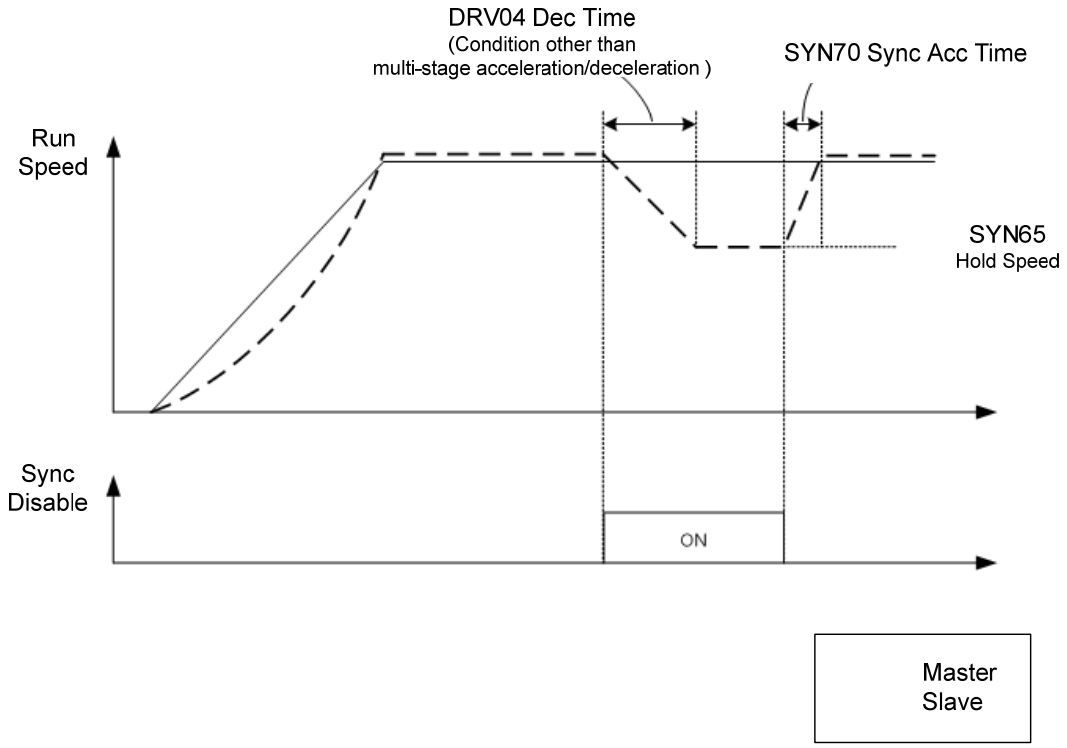
IN-65~72 Px Define: Sync Disable

If any Function Input that has been set to Sync Disable is turned On, Synchronization operating will be prohibited.



IN-65~72 Px Define: Sync Hold

SYN-65 Hold Speed



IN-65~72 Px Define: Sync Reset

SYN-75 Sync Reset

It is possible to initialize both of the master's Return Pulse and the slave's Return Pulse to be inputted to the Slave inverter to 0. Turn on the inverter's multi-function Input Sync Reset or answer Yes to SYN-75 Sync Reset condition.

After initializing the master/slave pulse, make sure to turn the multi-function Input Sync Reset Off and set SYN-75 Sync Reset to No to perform Position Sync operating.

Position Pulse Save Function

Save the master and slave's position pulse (32bit) respectively. Therefore, it is possible to restart Position Sync operating from the previous position when recovering the power.

SYN-07 Master Speed

SYN-08 Slave Speed

It is possible to monitor the master and slave load axis's speed respectively.

SYN-11 Master Pulse H

SYN-12 Master Pulse L

It is possible to monitor the master load axis's current pulse. SYN-11 Master Pulse H shows higher 16bit and SYN-12 Master Pulse L shows lower 16bit.

SYN-13 Slave Pulse H

SYN-14 Slave Pulse L

It is possible to monitor the slave load axis's current pulse. SYN-13 Slave Pulse H shows higher 16bit and SYN-14 Slave Pulse L shows lower 16bit.

SYN-15 M/S Pulse Dev

It is possible to monitor the deviation between the master load axis's current pulse and the slave load axis's current pulse.

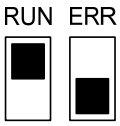
For example, if SYN-15 M/S Pulse Dev is ±11 from1024 pulses/rev Encoder, it means ±1 degree (=pi/360 [rad]) of error.

SYN-01 Sync S/W Ver

It refers to synchronization option card S/W version.

SYN-02 Sync LED Stat

It shows the state of Synchronization option card's RUN LED, ERR LED.



If RUN LED is flickering in 1-second interval and ERR LED is turned off, it means it is running normally.

Even though RUN LED is flickering in 1-second interval and ERR LED is flickering in a fast interval (about 400ms), it shows that any error takes place when exchanging data between the inverter body and the synchronization option card.

SYN-17 Comm Err Cnt

It counts the number of errors that take place when receiving and sending data between iS7 inverter body and Synchronization option card. If any value other than 0 is displayed, stop operating and check the inverter body and the synchronization option card for the connection between them.

6. Speed Sync Operating

The master's load axis and a number of slave load axes are synchronized and operated under the same speed.

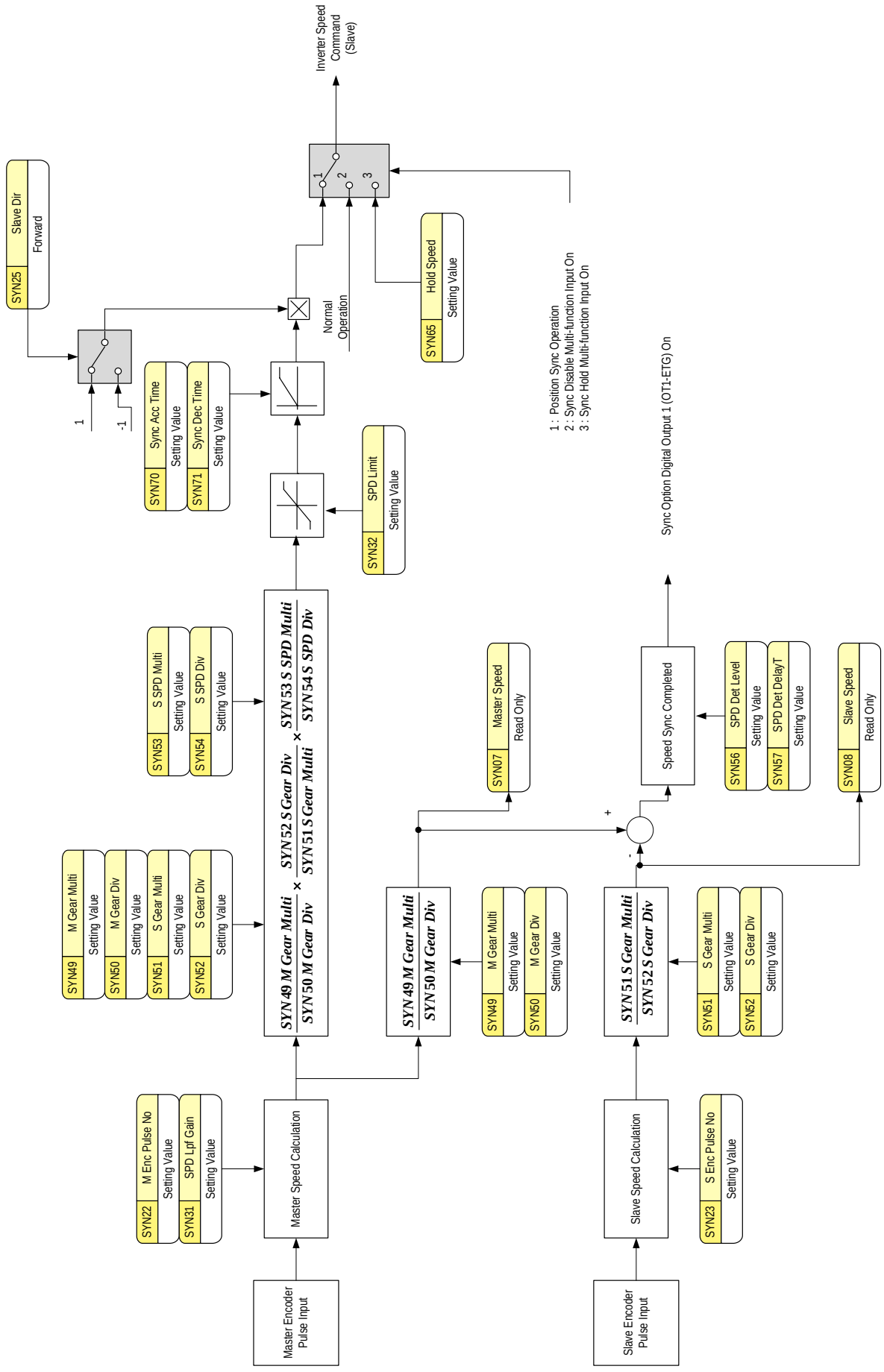
The master inverter does not need any synchronization option card but the slave inverter uses the synchronization option card to follow the master inverter's speed.

Group	No	Function Display	Setting Value	Setting Range	Unit
SYN	01	Sync S/W Ver	Read only	-	-
SYN	02	Sync LED Stat	Read only	-	-
SYN	03	Sync DO Stat	Read only	-	-
SYN	07	Master Speed	Read only	-	rpm
SYN	08	Slave Speed	Read only	-	rpm
SYN	17	Comm Err Cnt	Read only	-	-
SYN	21	Sync Mode	0 : SPD Ctrl	0 : SPD Ctrl 1 : POS Ctrl	
SYN	22	M Enc Pulse No	1024	360~4096	-
SYN	23	S Enc Pulse No	1024	360~4096	-
SYN	25	Slave Dir	0 : Forward	0 : Forward 1 : Reverse	-
SYN	31	SPD Lpf Gain	10	0~30000	ms
SYN	32	SPD Limit	1800	100~3600	rpm
SYN	49	M Gear Multi	1	1~30000	-
SYN	50	M Gear Div	1	1~30000	-
SYN	51	S Gear Multi	1	1~30000	-
SYN	52	S Gear Div	1	1~30000	-
SYN	53	S SPD Multi	1	1~30000	-
SYN	54	S SPD Div	1	1~30000	-
SYN	56	SPD Det Level	20.0	0.0~1000.0	rpm

Group	No	Function Display	Setting Value	Setting Range	Unit
SYN	57	SPD Det DelayT	1.00	0.00~300.00	sec
SYN	65	Hold Speed	3.00	0.00~maxFreq	Hz
SYN	70	Sync Acc Time	0.1	0.0~100.0	sec
SYN	71	Sync Dec Time	0.1	0.0~100.0	sec
IN	65 ~72	Px Define	Sync Disable	-	-
			Sync Hold		

SYN-21 Sync Mode

If SPD Ctrl is selected, Speed Sync operating will be carried out. The entire block diagram is as following:


Inverter Speed Command (Slave)
1
2
3
SYN25 Slave Dir
Forward
1
-1
Normal Operation
SYN65 Hold Speed
Setting Value
1 : Position Sync Operation
2 : Sync Disable Multi-function Input On
3 : Sync Hold Multi-function Input On
SYN70 Sync Acc Time
Setting Value
SYN71 Sync Dec Time
Setting Value
SYN32 SPD Limit
Setting Value
Sync Option Digital Output 1 (OT1-ETG) On
SYN53 S SPD Multi
Setting Value
SYN54 S SPD Div
Setting Value
SYN07 Master Speed
Read Only
Speed Sync Completed
SYN56 SPD Det Level
Setting Value
SYN57 SPD Det DelayT
Setting Value
SYN08 Slave Speed
Read Only
SYN49 M Gear Multi
Setting Value
SYN50 M Gear Div
Setting Value
SYN51 S Gear Multi
Setting Value
SYN52 S Gear Div
Setting Value
SYN22 M Enc Pulse No
Setting Value
SYN31 SPD Lpf Gain
Setting Value
SYN23 S Enc Pulse No
Setting Value
Master Speed Calculation
Slave Speed Calculation
Master Encoder Pulse Input
Slave Encoder Pulse Input

SYN-22 M Enc Pulse No

SYN-23 S Enc Pulse No

Input the master and slave encoder's pulses/1 rev respectively.

SYN-25 Slave Dir

Refer to page 18.

SYN-31 SPD Lpf Gain

The master inverter's Return Pulse Output is inputted as the master pulse of this slave inverter's synchronization option card. It is possible to set low pass filter gain to that master pulse to make it less sensitive to noise. As a bigger set value is given, the response of the slave inverter's speed becomes lower even though the effect to remove noise is remarkable.

SYN-32 SPD Limit

It can limit the slave inverter's Output speed(rpm).

SYN-49 M Gear Multi

SYN-50 M Gear Div

SYN-51 S Gear Multi

SYN-52 S Gear Div

Refer to page 20~22.

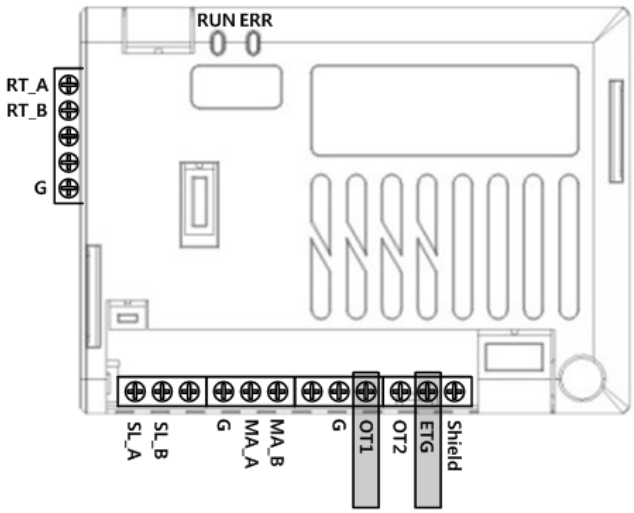
SYN-53 S Spd Multi

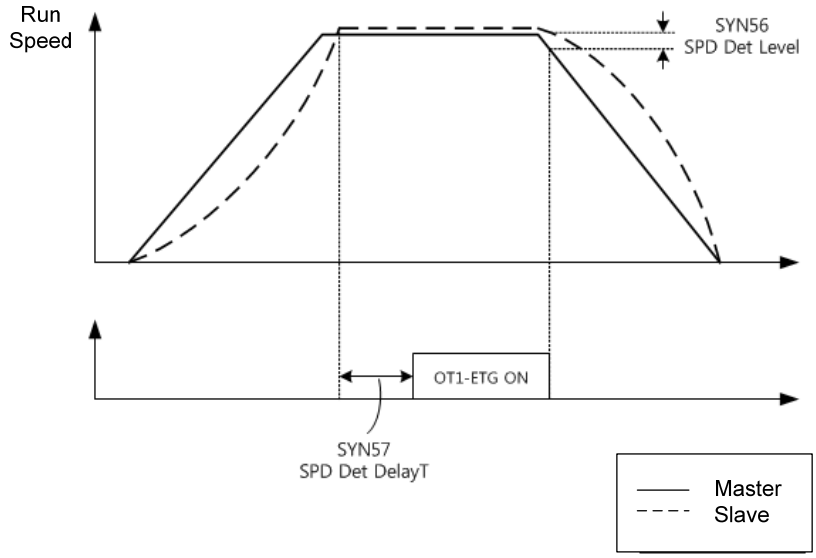
SYN-54 S Spd Div

The slave motor's speed gain shall be setted.

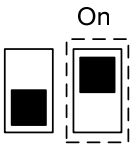
For example, if SYN-53 S Spd Multi and SYN-54 S Spd Div are 1 respectively regardless of the master/slave gear ratio, Speed Sync operating can be performed while the master motor's load axis is operating in 500rpm and the slave motor's load axis is also operating in 500rpm.

At this time, if SYN-53 S Spd Multi is set to 1000 and SYN-54 S Spd Div is set to 900, the final speed of the slave motor's load axis will be decided as following:

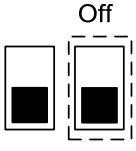




Open Collector Digital Output Contact 1 ON :



Open Collector Digital Output Contact 1 OFF :



SYN-70 Sync Acc Time

SYN-71 Sync Dec Time

Refer to page 23.

IN-65~72 Px Define : Sync Disable

Refer to page 24.

IN-65~72 Px Define : Sync Hold

SYN-65 Hold Speed

Refer to page 24.

SYN-07 Master Speed

SYN-08 Slave Speed

It is possible to monitor the master and slave load axis's speed respectively.

SYN-01 Sync S/W Ver

SYN-02 Sync LED Stat

Refer to page 26.

LS values every single customer.
Quality and service come first at LSIS.
Always at your service, standing for our customers.

www.lsis.biz

LS Industrial Systems

10310001151

■ **HEAD OFFICE**
Address: LS tower, 1026-6, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do 431-848, Korea http://eng.lsis.biz

■ **LS Industrial Systems Europe B.V 〉〉 Amsterdam, Netherland**
Address: 1st FL., Tupolevlaan 48, 1119NZ Schiphol-Rijk, The Netherlands
Tel: 31-20-654-1420 Fax: 31-20-654-1429 e-mail: junshickp@lsis.biz

■ **LS Industrial Systems (Middle East) FZE Office 〉〉 Dubai, UAE**
Address: LOB 19 Jafza View Tower Room 205, Jebel Ali Free Zone, P.O.Box 114216, Dubai, UAE.
Tel: 971-4-886-5360 Fax: 971-4-886-5361 e-mail: jungyongl@lsis.biz

■ **Dalian LS Industrial Systems Co., Ltd. 〉〉 Dalian, China**
Address: No. 15 Liaohexi 3-Road, Economic and Technical Development Zone, Dalian 116600, China
Tel: 86-411-8273-7777 Fax: 86-411-8730-7560 e-mail: lixk@lsis.com.cn

■ **LS Industrial Systems Wuxi Co., Ltd. 〉〉 Wuxi, China**
Address: 102-A National High & New Tech Industrial Development Area, Wuxi, Jiangsu 214028, China
Tel: 86-510-8534-6666 Fax: 86-510-522-4078 e-mail: xuhg@lsis.com.cn

■ **LS-VINA Industrial Systems Co., Ltd. 〉〉 Hanoi, Vietnam**
Address: Nguyen Khe, Dong Anh, Ha Noi, Vietnam
Tel: 84-4-882-0222 Fax: 84-4-882-0220 e-mail: srjo@lsisvina.com

■ **LS-VINA Industrial Systems Co., Ltd. 〉〉 Hochiminh, Vietnam**
Address: 41 Nguyen Thi Minh Khai Str. Yoco Bldg 4th FL., Hochiminh City, Vietnam
Tel: 84-8-3822-7941 Fax: 84-4-3822-7942 e-mail: sbpark@lsisvina.com

■ **LS Industrial Systems Tokyo Office 〉〉 Tokyo, Japan**
Address: 16th FL., Higashi-Kan, Akasaka Twin Tower 17- 22, 2-chome, Akasaka, Minato-ku, Tokyo 107-8470, Japan
Tel: 81-3-3582-9128 Fax: 81-3-3582-2667 e-mail: jschuna@lsis.biz

■ **LS Industrial Systems Shanghai Office 〉〉 Shanghai, China**
Address: Room E-G, 12th FL., Huamin Empire Plaza, No. 726, West Yan'an Road, Shanghai 200050, China
Tel: 86-21-5237-9977 (609), FAX: 89-21-5237-7191 e-mail: jinhk@lsis.com.cn

■ **LS Industrial Systems Beijing Office 〉〉 Beijing, China**
Address: B-tower 17th FL., Beijing Global Trade Center B/D, No.36, BeiSanHuanDong-Lu, DongCheng-District, Beijing 100013, China
Tel: 86-10-5825-6025, 7 Fax: 86-10-5825-6026 e-mail: cuixiaorong@lsis.com.cn

■ **LS Industrial Systems Guangzhou Office 〉〉 Guangzhou, China**
Address: Room 1403, 14th FL., New Poly Tower, 2 Zhongshan Liu Road, Guangzhou, China
Tel: 86-20-8326-6764 Fax: 86-20-8326-6287 e-mail: linsz@lsis.biz

■ **LS Industrial Systems Chengdu Office 〉〉 Chengdu, China**
Address: 12th FL., Guodong Building, No.52 Jindun Road, Chengdu, 610041, P.R. China
Tel: 86-28-8612-9151 Fax: 86-28-8612-9236 e-mail: yangcf@lsis.com.cn

■ **LS Industrial Systems Qingdao Office 〉〉 Qingdao, China**
Address: 7B40, Haixin Guangchang Shenye B/D B, No.9, Shandong Road, Qingdao 26600, China
Tel: 86-532-8501-6568 Fax: 86-532-583-3793 e-mail: lirj@lsis.com.cn

■ **본사 (Drive 사업부):** 경기도 안양시 동안구 호계동 1026-6 LS타워 B/D (우)431-080

신속한 서비스 접수, 든든한 기술상담
고객상담센터 전국어디서나 1544-2080

■ **구입 문의**

서울영업	TEL: (02)2034-4611~18	FAX: (02)2034-4622
부산영업	TEL: (051)310-6855~60	FAX: (051)310-6851
대구영업	TEL: (053)603-7741~7	FAX: (053)603-7788
서부영업 (광주)	TEL: (062)510-1885~91	FAX: (062)526-3262
서부영업 (대전)	TEL: (042)820-4240~42	FAX: (042)820-4298
서부영업 (전주)	TEL: (063)271-4012	FAX: (063)271-2613

■ **기술문의**

고객상담센터	TEL: (전국어디서나) 1544-2080	FAX: (041)550-8600
동현산전(안양)	TEL: (031)479-4785~6	FAX: (031)479-4784
나노오토메이션(대전)	TEL: (042)636-8015	FAX: (042)636-8016
신광ENG(부산)	TEL: (051)319-1051	FAX: (051)319-1052
씨에스티(부산)	TEL: (051)311-0337	FAX: (051)311-0338
에이엔디시스템(부산)	TEL: (051)317-1237	FAX: (051)317-1238

■ **교육신청 연락처:**

LS산전 연수원	TEL: (043)268-2631~2	FAX: (043)268-4384
서울 교육장	TEL: (031)689-7101	FAX: (031)689-7113
부산 교육장	TEL: (051)310-6860	FAX: (051)310-6851
대구 교육장	TEL: (053)603-7744	FAX: (053)603-7788

■ **A/S 문의**

서울 고객지원팀	TEL: (031)689-7112	FAX: (031)689-7113
천안 고객지원팀	TEL: (041)550-8308~9	FAX: (041)554-3949
부산 고객지원팀	TEL: (051)310-6922~3	FAX: (051)310-6851
대구 고객지원팀	TEL: (053)603-7751~4	FAX: (053)603-7788
광주 고객지원팀	TEL: (062)510-1883,92	FAX: (062)526-3262

■ **서비스 지정점**

명산전(서울)	TEL: (02)462-3053	FAX: (02)462-3054
TPI시스템(서울)	TEL: (02)895-4803~4	FAX: (02)6264-3545
신진시스템(안산)	TEL: (031)508-9606	FAX: (031)508-9608
우진산전(의정부)	TEL: (031)877-8273	FAX: (031)878-8279
성원M&S(인천)	TEL: (032)588-3750	FAX: (032)588-3751
태영시스템(대전)	TEL: (042)670-7363	FAX: (042)670-7364
파란자동화(천안)	TEL: (041)579-8308	FAX: (041)579-8309
디에스산전(청주)	TEL: (043)237-4816	FAX: (043)237-4817
지이티시스템(구미)	TEL: (054)465-2304	FAX: (054)465-2315
대명시스템(대구)	TEL: (053)564-4370	FAX: (053)564-4371
서진산전(울산)	TEL: (052)227-0335	FAX: (052)227-0337
동남산전(창원)	TEL: (055)265-0371	FAX: (055)265-0373
정석시스템(광주)	TEL: (062)526-4151	FAX: (062)526-4152
코리아산전(익산)	TEL: (063)835-2411~5	FAX: (063)831-1411

● LS Industrial Systems constantly endeavors to improve its product so that Information in this manual is subject to change without notice.
● 본 설명서에 기재된 제품은 예고 없이 단종이나 제품에 변동이 있을 수 있으므로 구입시 반드시 확인 바랍니다. ● 제품 사용 중 이상이 생겼거나 불편한 점은 LS산전으로 문의 바랍니다.

ⓒ LS Industrial Systems Co., Ltd 2011 All Rights Reserved.

SV-iS7 Series /2011.01